

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,  
WITH DESCRIPTIONS OF NEW SPECIES.—PART VIII.

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PLATES XI. TO XIII.

**Emarginula subtilitexta**, n. sp. Pl. xi., figs. 6, 7, 8.

Shell ovate, rather thin, white. Apex well curved, one-sixth of the length from the posterior end. Convex anteriorly from apex to margin; posteriorly concave below the apex, then convex, then somewhat spreading near the margin. Slit narrow, margined by a low thin erect lamella. Posterior two-thirds closed; closing callus sunken, scalloped with transverse erect lamellæ convex towards the apex. Sculpture: 60 radial ribs, low and flatly rounded, about one-half as wide as the interspaces, projecting beyond and crenulating the margin. Concentric narrow erect lamellæ rather crowded cancellate the surface. Interior smooth and white.

*Dim.*—Length, 6.5 mm.; breadth, 4.9; fissure, 1.4 mm.; height, 2 mm.

*Locality.*—110 fathoms, off Beachport, 1 dead.

*Diagnosis.*—*E. superba*, Hedley, has the same number of radial ribs and the dentate margin, but has higher concentric lamellæ. *E. dilecta*, A. Adams, has a similar sunken scalloped slit fasciole, and nearly the same number of radials, rather more; but has rudier ribs wider than their interspaces.

**Puncturella (Cranopsis) corolla**, n. sp. Pl. xi., figs. 1 to 5.

Shell thin, roundly oval, depressed conic. Apex eccentric, one-fifth of the length from the posterior end, spiral, well curved backwards. Protoconch projects on the right side and consists of two whorls, the first turn and a half are smooth, convex, glistening; the second half turn, which increases rapidly, is minutely crowdedly granular; at the junction of the two is a minute scar, the first part fitting into the second. In the adult shell the latter part of the protoconch looks directly backward. The sculpture of the shell begins gradually as accremental wrinkles, and next as radial riblets. Where the wrinkles commence the slit begins. The dorsum in front is a uniform convex curve, behind it is a continuous concave curve. The perforation occupies the middle third of the dorsal slope, and is lanceolate. Between it and the

protoconch its previous site is closed by a sunken lamina with subdistant erect transverse lamellæ, convex posteriorly. Between it and the anterior margin is a differentiated rib, broader and higher than the rest, fissured superficially throughout. In its upper part the fissure is as wide as the perforation, but is nearly closed internally by horizontal laminæ from the sides. It gradually contracts anteriorly to a fine line; in its upper half the fissure communicates with the interior, in the lower it is shut off. The slit fasciole and perforation are bounded on each side by a delicate erect lamina, highest at the perforation, in front of which the laminæ gradually approximate to form the differentiated rib. From the protoconch to the margin this lies a little to the right of the actual median line of the shell. Sculpture: Radial ribs, well rounded, nearly smooth, about as wide as their interspaces, sixteen primary, but increasing rapidly by intercalation of secondary and tertiary riblets to 90 in a shell of 10 mm. length, and crenulating the margin. These riblets appear first as gradually enlarging tubercles in the centre of the intercostal spaces, situated on the concentric laminæ, which conspicuously cross the interspaces, slightly scale the bases of the ribs, but are barely visible under the microscope on their summits. They produce radial lines of punctations in the interspaces, and in old dead specimens, where the glaze disappears from the interior, these appear as perforations. The ribs posteriorly are broader and closer together. Internally a small shelf or septum convex towards the interior, with a sharp simple margin anteriorly hides the upper fourth of the perforation, being attached to the shell at a distance from the margins of the perforation about equal to the width of the perforation; it gets gradually narrower and less obvious posteriorly. Its dorsal surface slopes up to the slit fasciole, the last one or two scales of which roof in the back of its cavity. From the perforation anteriorly runs a gutter to the margin; in older examples this becomes a thin central ridge. Shallow radial furrows correspond with the external ribs. As individuals get older, the shell grows more rapidly posteriorly, so that the apex gets less eccentric, and the back part becomes very flat and sloping.

*Dim.*—When half-grown, length, 10 mm.; width, 8 mm.; height, 1.4 mm.; apex, 1.8 mm. from the posterior end. When full-grown, length, 18 mm.; width, 15.4 mm.; height, 4.7 mm.; apex, 5.4 mm. from the posterior end.

*Locality.*—130 fathoms, off Cape Jaffa, 20 whole or broken; 300 fathoms, 4, all dead.

*Obs.*—The shell appears to fall within the limits of *Cranopsis*. I have no shells of this genus with which to com-

pare it, and the illustrations in Tryon's "Manual" are very small; but the perforation on the slope and the internal septum coincide with its definition. One can see in different individuals the varied aspects of the shell at successive stages, first a depressed spiral shell with a simple aperture; then an emarginula-like form, with a slit and slit fasciole; then a rimula-like shell, with a perforation just above the margin, continued as a narrow fissure to the border, and finally with the fissure closed and the perforation complete.

**Modiola projecta**, n. sp. Pl. xiii., figs. 12 and 13.

Shell solid, narrowly oblong, inequilateral. Umbo directed forward at the junction of the first and second fourth of the shell, approximate, round, inflated. Anterior dorsal margin with a uniform rounded slope, commencing just behind, and within the apex of the umbo, over the front of which it is reflected. Posterior dorsal margin straight, very gently convex. Anterior end round; posterior end sloping convex. Post-dorsal angle a very obtuse curve, post-ventral angle a much smaller curve. Ventral border nearly straight, slightly concave, almost parallel with the dorsal borders. Margin simple, smooth. A groove increasing in width runs from the umbo backwards within the post-dorsal border for three-quarters of its length, formed by a stout, projecting internal lamina, which widens for half its length, and then gradually dwindles. The posterior muscle scar is rather deep. Of the two oblique umbo-ventral ridges the anterior is the more distinct. Externally there are obsolete accremental striæ, and in the earlier stage distant, rounded, low, concentric ridges, more marked towards the front. Traces of a dark epidermis are present.

*Dim.*—Antero-posterior diam., 10.9 mm.; umbo-ventral, 4.1 mm.

*Locality.*—Off Beachport, 200 fathoms. One right valve.

**Modiolaria semiradiata**, n. sp. Pl. xiii., figs. 14 and 15.

Shell oblong-ovate, ventricose. Umbo terminal, flattened, directed forward, applied to the front end of the shell. Post-dorsal border straight, short, thin, then faintly curved. Posterior end round; ventral border straight, anterior end round. Margin crenulated on the edge, with rounded teeth along the curved part of the post-dorsal border and at both ends. The ventral border shows no teeth, but probably because it is a little eroded. A narrow oblique furrow runs between the apex of the umbo and the adjacent front margin of the shell. An inflated ridge runs from the umbo to the posterior end, steep on the dorsal side, and gently sloping on the ventral.

Accremental striæ irregular in distance and size mark the surface, and form rude flat concentric ridges at intervals. Well-marked radial striæ cover all the posterior half of the shell, extending from the umbo to the ventral border, somewhat interrupted at the edges of the concentric ridges; these are quite absent from the anterior half.

*Dim.*—Antero-posterior diameter, 8·9 mm.; umbo-ventral, 5·2; sectional of one valve, 3·5 mm.

*Locality.*—Cape Jaffa, 130 fathoms, one valve.

***Arcoperna scapha*, n. sp.** Pl. xii., figs. 1 to 5.

Shell small, solid, white, oval. Umbos terminal, round, inflated, directed slightly forward, approximate but not in contact. Prodissoconch very distinct, separated definitely from the dissoconch by a fine groove; its earliest third is quite smooth, its later two-thirds engraved with concentric lines, gradually growing more valid. Post-dorsal border nearly straight for 1·7 mm., forming an open rounded angle with the posterior border, which is nearly straight for 1·7 mm., then sweeps with a slight convexity into the short-curved, circular, ventral border. The anterior dorsal border is very short, almost entirely under the umbo. The antero-ventral border is slightly convex. The whole dorsum is engraved with crowded, slightly-curved, radial lines, latticed by concentric lines nearly as valid; some of the latter at distant intervals in the early stages of growth are much deeper, so as to form slightly imbricating ledges. The inner margin of the shell has fine denticulations from the end of the post-dorsal border all round and almost to the central extremity of the anterior dorsal border under the umbo; they do not reach the outer edge of the shell. The straight edge of the prodissoconch is set somewhat obliquely to the anterior dorsal border, the central extremity of which extends slightly behind the centre of the edge of the prodissoconch. The post-dorsal line is provided with many (more than 20) close-set, low, vertical teeth on its inner surface. Beneath them is the scar of the ligament for the anterior three-fourths of their extent, somewhat increasing in width posteriorly, and having a rounded end. It seems to pass out between the prodissoconch and the anterior dorsal hinge-line to become external. The anterior dorsal border has a few denticulations and one tooth, and is supported by a sort of thickening which projects slightly into the cavity of the shell and has a rounded central end. Two elongated muscle-scars occupy the middle third of the sides of the shell, not far from the margin, narrowing dorsally; the posterior is rather the larger.

*Dim.*—Antero-posterior diameter, 3·2 mm.; umbo-ventral, 4·5; sectional of closed valves, 3·6 mm.

*Locality.*—Off Beachport, 49, 100, 110, 150, 200 fathoms; off Cape Jaffa, 90 and 130 fathoms; off Cape Borda, 55 fathoms; east of Neptunes, 45 fathoms. Only one living specimen was taken in 45 fathoms. Valves were secured in numbers, chiefly between 45 and 110 fathoms; beyond this depth they were few. Mr. Hedley reports to me that it has been taken in 80 fathoms, 22 miles east of Narrabeen, New South Wales.

*Diagnosis.*—It somewhat resembles *Crenella globularis*, Tate, a tertiary fossil; but this is a wider shell comparatively, and more symmetrical.

The generic location of this shell has been somewhat difficult, and Mr. Hedley and Mr. Etheridge and Mr. Kesteven have compared it with allies in the Australian Museum, Sydney, and discussed its characters, and as a result it has been placed in *Arcoperna*, and becomes a second recent Australian species of this previously fossil genus, the first, *A. recens*, having been figured and described by Tate in Journ. Mal. Soc., Lond., 1897, p. 181.

#### ***Leptothyra carinata*, n. sp.**

Figured in Trans. Roy. Soc. of S. Austr., vol. xxxi., 1907; pl. xxix., fig. 8.

Shell minute, solid, three and a half whorls. The first two whorls are smooth, white and convex. The spire-whorl shows three rounded carinations, one just below the suture which is channelled by it, the second about one-third the distance between the sutures, and the third about one-fourth the distance from the lower suture. The interspaces are concave, and have spiral cords, equidistant; two in the upper space, the posterior the smaller; three in the middle space, small and equal. The body-whorl has seven carinations which become gradually lower towards the base, and closer; interspaces concave, and provided with spiral liræ, varying from six to two, according to the width of the spaces. The lowest carina forms a margin to the umbilicus which is wide and sculptured with about eight spiral liræ. The spirals are cut up at irregular intervals by radial incisions, and marked by very fine crowded microscopic radial scratches. The aperture is circular; its inner surface smooth, and its outer scalloped by the spirals. Colour, very light amber; some examples are white, others faintly tinged with pink.

*Dim.*—Largest diameter 1·4 mm., smallest 1 mm.; height 1·1 mm.; width of aperture, ·7 mm.

*Locality*.—20 fathoms, outside Backstairs Passage, with six other examples, dead.

*Diagnosis*.—From *L. arenacea*, Pritchard and Gatliff; in its marked carinæ, more widely canaliculated suture, and wider umbilicus. From *Liotia alazon*, Hedley, in being a smaller shell, with less valid carinæ, and in its radial incisions.

***Cuspidaria dorsirecta***, n. sp. Pl. xi., figs. 9 and 10.

Shell small, moderately solid, oval, equilateral. Umbo prominent, acute, prosogyre. Post-dorsal line straight; anterior concave in front of the apex, then straight; the front end uniformly widely curved, ventral border gently curved, with very slight incurving at the base of the rostrum, which is very short and wide. Well-marked granulated ridge from the umbo to the postero-inferior angle of the rostrum; a second ridge cuts off its upper fourth. In front of the former is a moderate depression. Surface smooth but for sublenticular accretional striæ. It has one anterior and one posterior lateral tooth well developed, roundly-triangular; the latter slightly the larger, and from its end a very low but gradually rising lamina is continued nearly to the end of the rostrum, and forms a narrow, slightly-widening groove with the dorsal margin.

*Dim*.—Antero-posterior diameter, 5 mm.; umbo-ventral, 3.3 mm.

*Locality*.—Off Beachport, from 40, 100, and 110 fathoms; off Cape Borda, 60 fathoms; valves.

***Cuspidaria alta***, n. sp. Pl. xiii., figs. 8 to 11.

Shell small, thin. Umbo tumid, blunt. Anterior dorsal border very faintly convex sloping; posterior dorsal border concavely sloping. Anterior end sharply rounded; posterior moderately and broadly rostrated. Ventral border uniformly widely arcuate, running concavely into the rostrum. An oblique, gradually-widening depression between the body and the rostrum, and an oblique ridge between its lower angle and the umbo; there is a second ridge close to the median line, the intervening space nearly flat. Outer surface smooth, but for sublenticular concentric striæ, which are much more marked on the rostrum. Right valve with an anterior and posterior triangular lateral tooth, the latter the larger, and its groove running some distance into the rostrum. Left valve edentulous, and lies within the margin of the right. The pallial line ends by a nearly vertical curved line from the umbo.

*Dim*.—Antero-posterior diameter, 6.8 mm.; umbo-ventral, 4 mm.

*Locality*.—Off Beachport, in 100 fathoms, 1 valve; 150 fathoms, 2 valves. Off Cape Jaffa, in 90 fathoms, 20 valves; in 130 fathoms, 1 valve. South-west of Neptunes, 104 fathoms, 3 alive and 26 valves.

***Cuspidaria angasi*, E. A. Smith.**

*Neæra angasi*, n. sp., E. A. Smith, Chall. Zool., vol. xiii., 1885, p. 47, pl. ix., f. 2. *Type locality*.—Sta. 164B, off the coast of New South Wales, 410 fathoms, green mud.

Dredged in 130 fathoms, off Cape Jaffa, 2 alive, 1 dead, 3 valves.

The ventral border and the lower border of the rostrum of the right valve lie within the margin of the left valve, while its dorsal borders, anterior and posterior, extend beyond those of its fellow.

***Cuspidaria exarata*, n. sp. Pl. xii., figs. 6 and 7.**

Shell ovately-pyriform, subequilateral, thin. Umbo round, inflated, directed backwards. Anterior dorsal margin slightly convex; front end with a round, uniform curve; ventral border gently arcuate, joining the rostrum with a short incurvation. Post-dorsal slope nearly straight, barely incurved; rostrum short, slightly tapering. Fossette small, directed obliquely backwards. Right valve has no distinct tooth, but a low lamina runs from the fossette backwards for half the length of the posterior slope, to make a shallow, narrow furrow with its slightly more projecting border. The anterior dorsal slope is bevelled on its inner side, and has the trace of a furrow within it near the fossette. Interior glistening, smooth, white, with subdistant radial translucent lines ending at the simple pallial line. Externally about twenty triangular concentric ribs, with sharp lirate summits and sub-lenticular concentric striæ on their sides; the ribs become less costate and more lamelliform towards the ventral margin, and at the depression in front of the rostrum, over which they are only irregular vertical striæ. Colour dull opaque white, with faint axial less white striations.

*Dim*.—Antero-posterior diameter, 13·2 mm.; umbo-ventral, 7·5 mm.

*Locality*.—35 miles south-west of Neptune Islands, in 104 fathoms, one right valve perfect and the posterior half of a left valve, which if whole would be half as large again as the type.

*Diagnosis*.—It closely resembles *C. trailli*, Hutton, as figured by Mr. Hedley in Trans. N.Z. Institute, vol. 38, 1905, p. 72, pl. ii., figs. 9, 10, 11, dredged in 110 fathoms, east of the Great Barrier Island. It is also about the same size, mine

probably varying from 13 to 19 mm.; his example was 15 mm. Three differences appear. My species is more concave along the post-dorsal border, shows only bare traces of umbo-rostral liræ, and has no teeth in its right valve projecting beyond the vertical plane. Mr. Hedley tells me he has the same shell from 250 fathoms, off Sydney.

**Cuspidaria (Cardiomya) pinna**, n. sp. Pl. xiii., figs. 5 to 7.

Shell squarely oval, ventricose, rather thin, umbos inflated, rounded, approximate. Front dorsal border short, straight, scarcely convex, joining by a rounded slightly obtuse angle the straight barely incurved anterior end. This with a faint angulation joins the open-curved ventral border, which, after a definite incurvation, unites with the lower border of the rostrum. The post-dorsal border is feebly-concave to the end of the rostrum, which is rounded at its rather attenuated end.

The sculpture is very bold. Three distant valid round ribs curve from the umbo to the posterior third of the ventral border. In front of these are about seventeen subequal less prominent rounded ribs, equal in width to their interspaces. Behind them are two rather distant, less valid ribs, and three more extend from the umbo to the end of the rostrum. All these ribs furrow the inside of the shell, and all crenulate or scallop the ventral border in the ratio of their size and distance. The border of the rostrum is not scalloped. There are microscopic accremental striæ, most marked and erect towards the end of the rostrum. Immediately beneath the umbo is a small triangular cartilage pit, wider than high. In the right valve is a triangular laminar posterior lateral tooth, with a slight furrow forward to the pit and backwards nearly to the rostrum. Anteriorly, there is a long invalid lamina just within the border. The left valve has an anterior lamina, which forms, with its front dorsal margin, a shallow furrow to receive the lamina of the right valve. The post-dorsal margin of the left valve and its anterior lamina form a straight line, only interrupted by the notch of the cartilage pit.

The left valve lies inside the right valve throughout its post-dorsal border; the right valve lies inside the left, markedly along the posterior two-thirds of the ventral border, barely along its anterior third, and distinctly along the straight anterior end, where the right valve has a rather more concave edge than the left.

*Dim.*—Antero-posterior diam., 6.5 mm.; umbo-ventral, 4.1; section of united valves, 2.75.



*Hab.*—Off Cape Jaffa, in 300 fathoms, 3 alive and 12 valves; in 130 fathoms, 1 alive and 11 valves.

*Diagnosis.*—It is very closely allied to the *Cuspidaria perrostrata*, Dall, Bull. Mus. Comp. Zool., Harvard Coll., Cambridge, xii., 1885-1886, p. 296, pl. ii., figs. 3a, 3b, obtained in 339 fathoms, off Tortugas, and in 416 fathoms, gray ooze, near Grenada. Also in Bull., 37, United States National Mus., 1889, p. 66, pl. ii., figs. 3a, 3b. My species has a shorter rostrum, and the three bold ribs give it a distinct aspect. Dall says there is a good deal of variation in this group, and though my specimens vary scarcely at all, they may prove to be a variety of Dall's species. This shell contributes another new subgenus to the South Australian record, viz., *Cardiomya*.

***Cuspidaria (Halonympha) ros***, n. sp. Pl. xiii., figs. 1 to 4.

Shell small, inflated, pyriformly orbicular, very thin, diaphanous. Umbos visible, tumid directed somewhat backwards. Post-dorsal border a gentle incurved slope; anterior nearly continuous with the posterior for about two millimetres, then sweeping with an almost circular curve round the whole front and ventral border, to merge into the obliquely upward slope of the lower border of the rostrum, which is short, rather tapering, and round-ended.

Immediately beneath the minute approximate apex of each umbo is a projection carrying a tiny elongate cartilage pit. Some little distance behind this a wide-curved hollowed lamina, like half the bowl of a spoon, stands out in each valve.

There is a small elongate laminar cardinal tooth in front of the fossette of the right valve; none in the left.

The surface is smooth, but for microscopic concentric striæ, chiefly near the ventral margin.

*Dim.*—Antero-posterior diameter, 6 mm.; umbo-ventral, 4; sectional of closed valves, 2.5 mm.

*Locality.*—300 fathoms, off Cape Jaffa, 2 alive and 3 valves; 130 fathoms, 3 alive and 14 valves.

This new species introduces, for South Australia, a new subgenus, *Halonympha*, created by Dall and Smith, with *Neara claviculata*, Dall, as the type (Bull. of Mus. of Comp. Zool., Harvard Coll., Cambridge, vol. xii., 1885-1886, p. 301). It is characterized by an acute cardinal tooth in the right valve, none in the left; a small central fossette, and by a clavicular rib or myophore in the posterior part of each valve.

Our shell is very closely allied to *Neara claviculata*, Dall, Bull. Mus. Comp. Zool., 1881, vol. ix., p. 112, and *Halonympha claviculata*, Dall, Bull. Mus. Comp. Zool., Harvard

Coll., vol. xii., 1885-1886, p. 301, pl. ii., figs. 2 and 2a; also No. 425, p. 68, pl. ii., figs. 2 and 2a, in Bull. of the U.S. National Mus., xxxvii., 1889. *Type locality*.—North Atlantic, from 100 to 539 fathoms; also Chall. Zool., xiii., 1885, p. 52, pl. ix., figs. 8, 8b. *Locality*.—Bermudas, 425 fathoms, coral mud; here by the artist's mistake the clavicular process is omitted from the figure. But, judging from the illustrations and measurements given, our species differs in having a slightly longer rostrum, in being much smoother, and in its more spoon-shaped clavicle.

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EXPLANATION OF PLATES.

PLATE XI.

|         |   |                                    |
|---------|---|------------------------------------|
| Fig. 1. | <i>Puncturella (Cranopsis) corolla</i> , Verco, | ventral view.                      |
| “ 2.    | “ “ “ “ “                                       | young specimen showing protoconch. |
| “ 3.    | “ “ “ “ “                                       | dorsal view.                       |
| “ 4.    | “ “ “ “ “                                       | sculpture.                         |
| “ 5.    | “ “ “ “ “                                       | profile.                           |
| “ 6.    | <i>Emarginula subtilitexta</i> , Verco,         | profile.                           |
| “ 7.    | “ “ “ “ “                                       | dorsal view.                       |
| “ 8.    | “ “ “ “ “                                       | sculpture.                         |
| “ 9.    | <i>Cuspidaria dorsirecta</i> , Verco,           | exterior.                          |
| “ 10.   | “ “ “ “ “                                       | interior.                          |

PLATE XII.

|      |                                    |   |
|------|------------------------------------|---|
| “ 1. | <i>Arcoperna scapha</i> , Verco,   | prodissoconch.  |
| “ 2. | “ “ “ “ “                          | profile, joined valves.   |
| “ 3. | “ “ “ “ “                          | interior.   |
| “ 4. | “ “ “ “ “                          | exterior.   |
| “ 5. | “ “ “ “ “                          | shell tilted up, so as to show the deep groove for the reception of the ligament. |
| “ 6. | <i>Cuspidaria exarata</i> , Verco, | exterior.   |
| “ 7. | “ “ “ “ “                          | interior.   |

PLATE XIII.

|       |  |                    |
|-------|--|--------------------|
| “ 1.  | <i>Cuspidaria ros</i> , Verco,         | exterior, lateral. |
| “ 2.  | “ “ “ “ “                              | joined valves.     |
| “ 3.  | “ “ “ “ “                              | hinge.             |
| “ 4.  | “ “ “ “ “                              | “ “                |
| “ 5.  | <i>Cuspidaria pinna</i> , Verco,       | exterior, lateral. |
| “ 6.  | “ “ “ “ “                              | hinge.             |
| “ 7.  | “ “ “ “ “                              | “ “                |
| “ 8.  | <i>Cuspidaria alta</i> , Verco,        | exterior, lateral. |
| “ 9.  | “ “ “ “ “                              | hinge.             |
| “ 10. | “ “ “ “ “                              | “ “                |
| “ 11. | “ “ “ “ “                              | “ “                |
| “ 12. | <i>Modiola projecta</i> , Verco,       | interior, lateral. |
| “ 13. | “ “ “ “ “                              | exterior.          |
| “ 14. | <i>Modiolaria semiradiata</i> , Verco, | exterior, lateral. |
| “ 15. | “ “ “ “ “                              | interior.          |